FOREST *INSECT AND DISEASE* CONDITIONS IN THE UNITED STATES 1973

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FOREST INSECT AND DISEASE CONDITIONS BY REGIONS

ALASKA (R-10)

by

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Conditions in Brief

A discussion of annual forest insect and disease conditions in Alaska deserves a comment on surveillance intensity. As is true elsewhere, systematic detection surveys are designed to complement reports of insect and disease situations submitted by land managers and others recently returned from the "bush." There are approximately 119 million acres of "forest land" in the State, 28 million of which is classed as having commercial timber. Much of the commercial timber has not yet become economically marketable and little of that which is marketable is managed intensively. The State's road system is limited in extent and staffs of many land management agencies are small compared to their counterparts in the lower 48 States. It follows that intensity and precision of insect and disease detection varies according to accessibility, forest management intensity, and public concern for a particular forested area. Surveys range from intensive air and ground detection and evaluation efforts to occasional flights over vast areas of remote noncommercial taiga. Survey priorities must be adjusted to land management priorities, yet some documentation is needed of conditions in remote areas to aid us now and in the future. When one speaks of insect infestations or disease conditions in Alaska, he speaks of known infestations and conditions. A goal is to increase survey intensity each year. Success toward that goal involves the efforts of Forest Service insect and disease specialists and field-going personnel of all land managing agencies.

Spruce beetle infestations continued to draw attention in the Cook Inlet basin. Some populations declined due to host depletion, others expanded or intensified. Hemlock sawfly and western black-headed budworm populations were most prevalent near Ketchikan. Renewed ips beetle activity in white spruce was recorded along the Yukon and Porcupine Rivers. Principal disease activities were suppression and evaluation efforts in western hemlock stands infected by dwarf mistletoe and cooperative updating of cull factor data in southeast Alaska forests. Locations of significant insect and disease outbreaks are shown on the index map of Alaska (fig. 1).

Status of Insects

Spruce beetle, *Dendroctonus rufipennis* (Kby.). This insect remained a focal point in Alaska during 1973. Aerial observations and field data indicated that the infestation on State and Indian lands near Tyonek, while declining in areas of heavy stand depletion, was continuing in stands that contained sufficient host-tree material. The Tyonek infestation covered 103,000 acres in 1973 (fig. 2). Heaviest current beetle concentration exists between the McArthur and Chakachatna Rivers. The area immediately north of the Tyonek Indian Reservation and Congahbuna Lake has an increasing accumulation of dead white spruce. The density of trees attacked, however, is closely related to the scattered and dispersed host type in that area. Increased tree mortality was also recorded along the Beluga River southeast of Beluga Lake. The original portion of the infestation in the vicinity of Stedatna Creek has declined.

The spruce beetle periodically causes heavy damage in Alaska's white spruce stands. In an effort to determine the extent of damage, the 20-square-mile Stedatna Creek area of formerly heavy infestation was sampled. It was found that 65 percent of white spruce of 5 inches d.b.h. and larger had been killed. Detailed results of that study are forthcoming. The percentage of white birch in the stand became substantially greater following the outbreak.

A limited sample of spruce killed early in the infestation was sent to the Forest Products Laboratory in Madison, Wis. Cooking characteristics of the wood and strength properties of the pulp from dead spruce were good compared to green spruce. If the limited samples evaluated are representative of other beetle-killed trees, little problem is anticipated in the manufacture of high quality kraft or sulphide pulps. Dead trees are not as suitable for lumber because blue stain present in the sapwood is less acceptable in this industry.

In 1973 the State Division of Lands consummated a 10-year salvage sale near Tyonek that covered 223,000

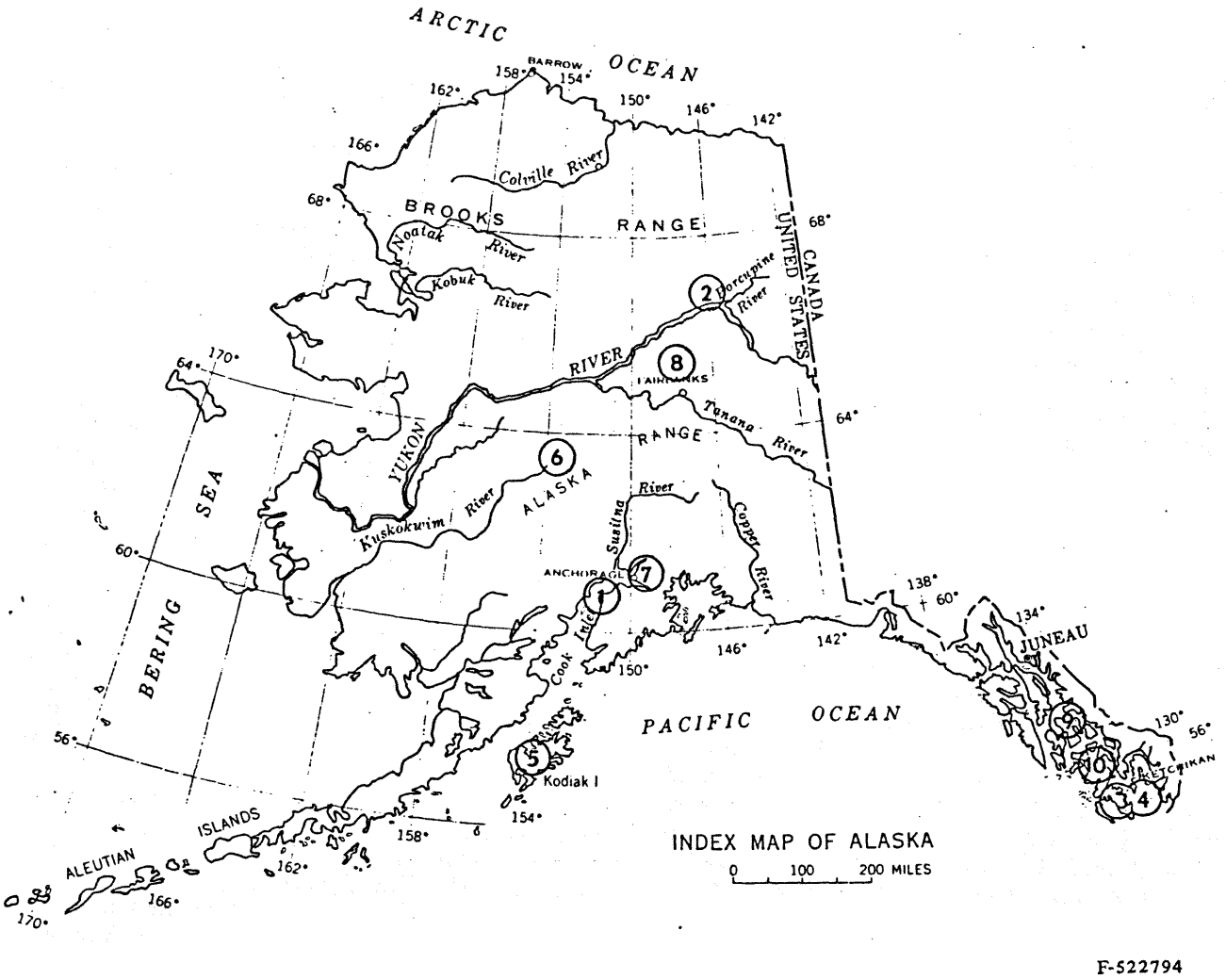

Figure 1.–Forest insect and disease conditions in Alaska in 1973. 1) Spruce beetle, 2) ips beetle, 3) hemlock sawfly, 4) western black-headed budworm, 5) *Operophtera hyperbeata*, 6) larch discoloration, 7) frost damage, 8) winter drying, 9) hemlock dwarf mistletoe, and 10) shoot blight of hemlock.

acres and a total of 425 million board feet of mixed species. Spruce sawlogs and utility logs comprised 285 million board feet of the sale and the bid price on spruce was $1 per thousand board feet. To facilitate sale layout, the Division of Lands was assisted by the Forest Service, University of Alaska, and others in obtaining full aerial photographic coverage of the sale area. Other efforts in remote sensing of the Tyonek infestation included Earth Resources Technology Satellite (ERTS) imagery coordinated through the University of Alaska's Geophysical Institute. Further cooperation between Institute and Forest Service personnel is planned. Of immediate usefulness in detecting spruce beetle outbreaks in remote areas of the State, is high altitude, small scale, aircraft photography. Despite the fact that coverage is limited at present, existing color infrared photos are capable of revealing outbreaks.

Farther south on the west side of Cook Inlet, spruce beetle activity occurred in Sitka spruce. The outbreak was near Red Glacier on Bureau of Land Management (BLM) lands. An intensive aerial survey was flown to assist BLM in appraising salvage opportunities. Beetle-infested trees were mapped on 4,190 acres. Additional spruce mortality is expected in both the Tyonek and Red Glacier infestations.

The generally declining beetle populations that were reported on the Kenai Peninsula in 1972 continued to subside. The acreage of active infestation on the Kenai National Moose Range and on State and private lands southwest of Tustumena Lake have declined to approxi-

mately 53,000 acres. The outbreak is intensifying but is not spreading. Remaining activity is concentrated in an area southwest of Turnagain Arm and Chickaloon Bay in the vicinity of Miller Creek, Two-Island Creek, Barbara Lake, and the Swanson Lakes. While some current tree mortality is occurring north of Kenai and west of the highway between Soldotna and Kasilof, damage is relatively light compared to the abundance of previously killed trees in those areas.

A beetle outbreak on Afognak Island in 1933 caused a loss of 150 million board feet of Sitka spruce. In anticipation of a 332-million-board-foot sale on the Chugach National Forest there, a 1973 appraisal of present beetle risk was undertaken. Beetle broods were very low in the few cull logs remaining after a current sale.

Ips beetles, *Ips* spp. An aerial survey was made of Bureau of Land Management lands in an area northwest of Fort Yukon that had historically supported chronic ips beetle populations. The last recorded infestation period in the vicinity of the Porcupine, Coleen, Sheenjek, and Chandalar Rivers occurred in the 1950's. Large expanses of dead white spruce are still apparent from that outbreak. Little surveillance is recorded for the area since that time. This year's survey indicated several years of recent tree mortality along the river bottoms. A prevalent species in the area is *Ips perturbatus* (Eichh.). Ips beetles in the Yukon-Porcupine country tend to build up in flood- or fire-damaged white spruce and then begin attacking healthy trees. The braided river channels that are typical of the area are unstable. Shifting river courses periodically cause numerous bands or arcs of timber to be flooded. This source alone provides for adequate population buildup of ips beetles. The insects are an integral component of the local river bottom ecosystem. There are apparently periods of years when tree mortality becomes higher than average. Also contributing to ips buildup in the area is the construction of seismic lines for petroleum exploration. The significance of these lines as a contributing factor depends upon the extent of area that they traverse. At present beetle buildup is occurring within approximately an eighth of a mile of where seismic lines occasionally pass through blocks of white spruce type. Flooding has apparently been the main cause of the recent infestation. The infestation is discontinuous but occurs over a 1,500-square-mile expanse beginning near the confluence of the Hadweenzic and Yukon Rivers and extending eastward across the Yukon Flats and lower Chandalar River to Fort Yukon, and thence up the Porcupine River to Shuman House and the lower Sheenjek River.

Hemlock sawfly, *Neodiprion tsugae* (Midd.). Sawfly defoliation of western hemlock continued in 1973 in that portion of southeast Alaska south of Sumner Strait. Approximately 13,000 acres of defoliation were observed from the air on National Forest land. On the east side of Prince of Wales Island, defoliation was concentrated in the North Arm of Moira Sound, Port Johnson, Paul Lake, Dutch Harbor, Windy Point, Windfall Harbor, Karta Bay, Dora Bay, and the South and West Arms of Cholmondeley Sound. On Revillagigedo Island, sawfly feeding was conspicuous in Ward and Whipple Creeks, at California Head, and in Thorne Arm and Princess Bay. Several of these areas also supported significant populations of western black-headed budworm. Ward Creek is accessible by road from nearby Ketchikan and supports considerable recreation activity in the summer months. Defoliation there has aroused public attention. Larval counts in 1973 varied, some sample points showing increases over 1972 and others showing a reduction. Egg counts in the fall of 1973 indicated reduced feeding in 1974.

A cooperative study was begun in 1973 to identify stand factors associated with recurring hemlock sawfly outbreaks and to evaluate long-term stand impacts of defoliation, the degree of top-kill, and growth loss. The study involves Forest Service entomologists in both Forest Pest Control and in Forest Insect and Disease Research. An objective is to better assist land managers in scheduling conversion of old-growth stands to second-growth regeneration.

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Figure 2.—White spruce killed by spruce beetle near Tyonek, Alaska.

Western black-headed budworm, *Acleris gloverana* (Wlshm.). An anticipated increase in budworm feeding in 1973 materialized in the southern part of the Tongass National Forest. Although defoliation often was too light to be detected from the air in old-growth stands, larval counts were considerably higher than in 1972 or 1971. Several areas yielding high budworm larval counts were also pockets of intense hemlock sawfly activity. Much of the 13,000 acres of defoliation on Prince of Wales and Revillagigedo Islands included budworm feeding.

Locations on Prince of Wales Island with substantial budworm increases in 1973 were Moira Sound, Dora Bay, and the West Arm of Cholmondeley Sound, and Polk and McKenzie Inlets. Increases also occurred at California Head on Revillagigedo Island and Saks Cove on the mainland. A localized infestation was discovered at the south end of Chilkoot Lake near Haines.

As budworm activity increases, infested areas are being incorporated into a cooperative stand impact measurement study conducted by Forest Service Insect and Disease Control and Research entomologists.

Other insects. Subtle defoliation of deciduous trees and shrubs by a geometrid, *Operophtera hyperbeata* (Hulst), was observed for the second year by Kodiak Island residents. By early August defoliation was reported on much of the Island. Field reports were received from the city of Kodiak, Karluk Lake, Larsen Bay, and nearby Onion Bay on Raspberry Island. Plants principally affected were alder, willow, cottonwood, highbush cranberry, and some elderberry. Occasional Sitka spruce growing beneath deciduous branches also sustained a small amount of damage to buds and new foliage. Although some twig and branch mortality may occur, whole plant mortality is not expected to be common. A second bud break had begun on many plants by mid-August.

Of local interest in the Juneau area were patches of alder defoliation up to an acre in size caused by the striped alder sawfly, *Hemichroa crocea* (Fourcroy). Some defoliation also occurred during the previous 2 years.

Status of Diseases

Hemlock dwarf mistletoe, *Arceuthobium tsugense* (Rosend.) G. N. Jones. A total of 350 acres of mistletoe control work was conducted on the Stikine Area of the Tongass National Forest in the Fiscal Year of 1973. Control consisted of removing infected residual trees remaining after logging.

A study to determine growth loss caused by dwarf mistletoe in young growth western hemlock stands (less than 100 years old) was begun in 1973. Infected and otherwise comparable uninfected trees were dissected. A preliminary analysis of data collected will help to determine the future course of the study.

Sirococcus shoot blight, *Sirococcus strobilinus* (Desm.) Petr. This disease was first observed in southeast Alaska at Thomas Bay in 1967. Since its initial discovery it has been found to be well distributed south of Sumner Strait. Thomas Bay remains the "hot spot" with severe growth reduction, deformity, and some mortality occurring in western hemlock reproduction. In a series of plots established by Stikine Area personnel in uninfected hemlock, the infection rate increased from zero to 65 percent in 1 month (fig. 3). Some Sitka spruce saplings at Thomas Bay are showing the shoot blight symptoms. Damage to the spruce is light and the disease may only be doing some natural thinning in this species.

Hemlock canker, *Caliciopsis pseudotsugae* (Fitzpatric). Approximately 3,000 acres of cankered western hemlock was reported at Neck Lake on Prince of Wales Island. The cankers were found to be caused by *C. pseudotsugae*. Understory hemlock were dead or dying

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Figure 3.—*Sirococcus* shoot blight on western hemlock regeneration.

and the crowns of overstory trees were showing the effects of cankering. Cankers with ascocarps were common on the dying understory trees. The fungus causes a perennial canker on coniferous hosts, infections occurring mainly through insect-feeding punctures and egg slits. *C. pseudotsugae* is found on hemlock growing on almost all sites within the coastal wet belt and normally causes little damage.

Spruce needle rust, *Chrysomyxa ledicola* (Pk.) Lagerh. Sitka spruce in the Mendenhall Valley near Juneau was again hit by needle rust. The discoloration of foliage was severe enough to arouse local interest but was still much less prevalent than in the previous year. Small scattered infected trees were noted in the vicinity of Petersburg and Ketchikan but little damage resulted.

Undetermined hemlock mortality. An unidentified disease caused some mortality in western hemlock at Edna Bay on Kosciusko Island. In stands which were partially harvested in the 1940's, scattered hemlock of all age classes show crown deterioration and mortality progressing from the lower branches toward the top. Most mortality was in the younger age classes.

Decay. The southeast Alaska cull study, a joint project of Region 10 and the Forestry Sciences Laboratory is about completed. Final data analyses have been made and results are being summarized. The study was designed to update existing cull factors prepared in 1956 and to improve tree volume estimates.

Frost damage. By early June, reports were received of foliage damage to paper birch in the Susitna River Valley on the southwest side of the Talkeetna Mountains. An aerial survey revealed 33,000 acres of what appeared as medium to heavy defoliation in the vicinity of Big Lake, Houston, and Willow. Damage is attributed to a premature bud break that occurred in the area, followed by spring frost along the base of the Talkeetna Mountains. The damage was noticeable to resident and nonresident recreationists that use the valley. All but a few "hot spots" had foliated by late July.

Winter drying. A 30-mile-long belt of winter drying was evident in spruce stands near the timberline on the north slope of the White Mountains near Mount Schwatka. The conspicuous foliage browning occurred on trees stressed by altitude as well as latitude. The growing sites are underladen with permafrost and have maximum exposure to northerly winds coming across the Yukon Flats from the Brooks Range.

Air pollution. Tree mortality in the vicinity of the pulpmill at Sitka is continuing. Chronic exposure to toxic sulphur emissions is associated with mortality of Sitka spruce, western hemlock, and Alaska cedar over approximately 400 acres.

An analysis was made of foliar samples collected near the pulpmill and of background samples collected 12 miles away at Old Sitka. Tree necrosis is known to occur at about 0.15 percent (by weight) sulphur level. Results of the analysis gave a sulphur content of 0.24-0.29 percent for Sitka spruce near the mill and 0.04 percent for the background sample. Comparable values for western hemlock were 0.31-0.39 percent versus 0.07 percent and for Alaska cedar 0.23-0.26 percent versus 0.04 percent. The sulfate content was 0.72-0.87 percent for Sitka spruce near the mill versus 0.12 percent for the background sample, western hemlock 0.93-1.17 percent versus 0.21 percent, and Alaska cedar 0.69-0.78 percent versus 0.12 percent.

Larch discoloration. A preliminary aerial reconnaissance of Bureau of Land Management land in interior Alaska revealed widespread yellowing of eastern larch approximately 140 miles southwest of Fairbanks. At the end of July, a dense distribution of individual trees appeared uniformly yellow in contrast with normal summer foliage of other larch. Some previous larch mortality was evident from the air. Normal autumn needle drop occurred before an on-the-ground examination could be arranged. A more thorough examination is

planned for 1974. Larch is scattered in muskegs and various moist soils in open stands with paper birch, black spruce, alder, and willow. The condition occurred intermittently over a 500-square-mile area extending from the confluence of the Herron and Foraker Rivers on the west across the McKinley River to Moose Creek, a tributary of the Kantishna River. Discolored crowns were observed farther north on the Kantishna River to a point 15 miles south of the abandoned village of Toklat.

OREGON AND WASHINGTON (R-6)

by

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Conditions in Brief

Defoliators were the most destructive insects in the Pacific Northwest forests during 1973. The Douglas fir tussock moth alone caused havoc on 689,760 acres of Douglas-fir and true fir in Oregon and Washington. The western spruce budworm has also been an important defoliator this past year. In Washington and Oregon, the budworm caused visible defoliation on 330,340 acres of Douglas-fir and true fir. Isolated populations of the black-headed budworm continue to cause minor defoliation of western hemlock in Washington.

Bark beetles remained active in the Pacific Northwest forests in 1973. The mountain pine beetle continued to cause heavy losses in lodgepole pine stands of eastern Oregon and in western white pine stands in the Cascade Mountains of both States. The western pine beetle losses in ponderosa pine stands in Oregon increased but there was a general decline in the Douglas fir bark beetle activity. Losses were light and scattered over both Oregon and Washington.

Root diseases were prevalent throughout the Northwest in 1973. Root rots caused serious losses to timber stands while damping-off fungi caused significant losses in forest nurseries. Needle casts of Scotch pine affected Christmas tree plantations in Oregon and Washington. The Dutch elm disease has been detected for the first time in Oregon.

Status of Insects

Douglas-fir beetle, *Dendroctonus pseudotsugae* Hopk. These insects killed approximately 7,136,000 board feet of Douglas-fir over Oregon and Washington in 1973. Losses this past year were only about one-third of those which occurred the previous year. Most of the damage was centered in the Columbia River Gorge of bot Oregon and Washington. Losses are expected to declin for at least another year.

Spruce beetle, *Dendroctonus rufipennis* (Kby.). Tre killing continued in Engelmann spruce stands on th Okanogan National Forest in Washington. Elsewhere i Oregon and Washington, spruce beetle populations hav declined. Aerial detection surveys reported widel scattered patches of mortality.

Fir engraver, *Scolytus ventralis* LeC., populatior continued to decline over the Pacific Northwest. Losse in true firs were light and scattered over most forests c eastern Oregon and Washington. Most of the damage i Oregon occurred on the Ochoco, Umatilla, and Winem National Forests. In Washington, the Mt. Bake Okanogan, and Wenatchee National Forests receive significant damage.

Mountain pine beetle, *Dendroctonus ponderosa* Hopk., continued to cause serious losses in lodgepol pine stands of Oregon. Nearly 35.5 million board feet c timber was killed this past year. More than one-half c this loss occurred on the Wallowa-Whitman Nation: Forest. In Washington, losses continued to be ligh Losses of western white pine continue high throughou the mountainous regions of both States. In Oregon, mos white pine losses occurred in the Willamette Nation: Forest. Losses in Washington were heaviest on th Snoqualmie and Wenatchee National Forests. Mountai pine beetle attacks in pole-sized ponderosa pine ir creased slightly in both Oregon and Washington.

Western pine beetle, *Dendroctonus brevicomis* LeC infestations increased in several mature and overmatu ponderosa pine stands in Oregon. Most of the loss occurred in central Oregon where over 4 million boar feet of ponderosa pine was killed on the Deschutes an Ochoco National Forests. In Washington, the loss w light and tree killing was widely scattered.

Douglas fir tussock moth, *Orgyia pseudotsugata* McI Outbreaks of this defoliator continued to infest ne acreage. In Oregon and Washington during 1973, light t heavy defoliation occurred on 672,490 acres as con pared to 196,810 acres in 1972. In addition to th acreage classified as defoliated only, another 17,27 acres were classified as dead in 1973.

Most of the devastation occured in the Blue Mou tains of northeast Oregon and southeast Washingtc where 629,500 acres were either defoliated or killed. C the Colville Indian Reservation in Washington, 36,17 acres received light to heavy defoliation. Defoliation als occurred on 23,450 acres of State and private lands i northeast and central Washington. A total of 160 acr were damaged on the Colville National Forest and 48 acres on the Wenatchee National Forest were defoliate